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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/776,609	02/12/2004	Shuji Mayama	118658	3940

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EXAMINER	
WILLOUGHBY, TERRENCE RONIQUE	
ART UNIT	**PAPER NUMBER**
2836	

DATE MAILED: 09/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/776,609	MAYAMA ET AL.	
	Examiner	Art Unit	
	Terrence R. Willoughby	2836	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-8 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-8 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 12 July 2004 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 7/12/04.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a) because they fail to show the "**related art 2**" drawing figure (See page 2, ll. 8) or a "**shunt-detection part 41**" (See page 9, ll. 25) and the "**pull-up resistor 35**" (See page 16, ll. 19) as described in the specification. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

2. Figure 3-5 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The disclosure is objected to because of the following informalities: On page 3, line 25, the word "ov rcurent" is misspelled. On page11, line 25, the phrase drive switch o the load " is misspelled which the examiner suggests it should be rewritten as "the drive switch of the load 11". On page 14, line 25, the word "elem nt" is misspelled. On page 15, line 25, the word "vercurrent" and "d tects" is misspelled.

Appropriate correction is required.

Claim Objections

4. Claim 3 recites the limitation "the other path" in ll. 5,8, and 19 of the claim. There is insufficient antecedent basis for this limitation in the claim.

5. Claim 4 recites the limitation "the other path" in ll. 3,6, and 16 of the claim. There is insufficient antecedent basis for this limitation in the claim.

6. Claim 5 recites the limitation "the drive switch" in ll. 2-3 of the claim. There is insufficient antecedent basis for this limitation in the claim.

7. Claim 6 recites the limitation "the drive switch" in ll. 18-19 of the claim. There is insufficient antecedent basis for this limitation in the claim.

8. Claim 7 recites the limitation "the drive switch" in ll. 9-10 of the claim. There is insufficient antecedent basis for this limitation in the claim.

9. Claim 8 recites the limitation "the drive switch" in ll. 25-26 of the claim. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant Acknowledged Prior Art (AAPA) and in view of Osawa (US 5,113,089).

12. Regarding claim 1, AAPA (Fig. 4 & 5), discloses an overcurrent limit circuit comprising:

a main function part (6) which switches a drive current for a predetermined load (111) between load between ON and OFF by an ON/OFF operation of a power-MOS-

FET used as a drive switch (12), and which drives the power-MOS-FET and protects overcurrent (29); and

wherein the main function part (6), in case that the voltage between a drain of the power-MOS-FET (12) and a source thereof is at least less than a predetermined threshold (23), has a function of limiting the electric current (25) flowing in the power-MOS-FET on the basis of the overcurrent (29).

The AAPA does not disclose a shunt-detection part which divides electric current applied to the drive switch from a power source side and detects the overcurrent.

However, Osawa (Fig. 2), discloses a current sensing circuit which is used in a power circuit (abstract) comprising a shunt-detection part (42,43,25) which divides electric current applied to the drive switch (21) from a power source side (29,30) and detects the overcurrent (col. 1, ll. 6-10) and a function of limiting the electric current (col. 3, ll. 27-30) flowing in a power-MOS-FET (21) on the basis of the overcurrent detected by the shunt-detection part.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the (AAPA) by providing a shunt-detection part which divides electric current applied to the drive switch from a power source side and detects the overcurrent as taught by Osawa to provide a overcurrent sensing circuit which has low power consumption and high sensing accuracy.

13. Regarding claim 2, The (AAPA) in view of Osawa discloses an overcurrent limit circuit according to claim 1. The (AAPA), in (Fig. 4&5) discloses wherein the main

function part (6) further has a function of limiting the electric current flowing in the power-MOS-FET (111) by chopping (21), in case in case that the voltage between the drain and the source of the power-MOS-FET is over the predetermined threshold (25).

14. Regarding claims 3 and 4, The (AAPA) in view of Osawa discloses an overcurrent limit circuit according to claims 1 and 2. Osawa (Fig. 2), discloses wherein the shunt-detection part comprises:

a shunt circuit (40) for dividing the electric current applied to the drive switch (21) from the power source side (29,30) at a predetermine shunt ratio (col. 3, ll. 22-30);

a current mirror circuit (42,43), one path of which a shunt current divided in the shunt circuit flows, and the other path of which a mirror current having a predetermined mirror ratio to the shunt current is obtained (col. 3, ll. 22-30);;

a constant current source (25) being set onto the other path of the current mirror circuit;

the shunt circuit includes:

a sense MOS-FET (22), a gate and a drain of which are connected to the drive switch (21) in common; and

a differential amplifier ((27) and col. 4, ll. 61-65), to which a source voltage of the sense MOS-FET (Vr) and source voltage of the drive switch (Vs) are input;

and

a detecting point of the overcurrent in the shunt-detection is set to an intermediate point on the other path connecting the constant current source (25) and the current mirror circuit (col. 3, ll. 15-30).

15. Regarding claims 5-8, The (AAPA) in view of Osawa discloses an overcurrent limit circuit according to claims 1-4. The (AAPA) in (Fig. 4&5) discloses wherein the main function part comprises:

a current limiter (25) for limiting the current flowing in the power-MOS-FET (12), in case that the voltage between the drain and the source of the power-MOS-FET is over a predetermined threshold; and

a protective logic circuit (21) for limiting the current flowing in the power-MOS-FET (112) by shutting off or chopping the drive switch; and

the main function part (6) has a function of limiting the electric current flowing in the power-MOS-FET (112) on the bases of the detection result through the protective logic circuit (21) or the current limiter (25).

The AAPA does not disclose a shunt-detection part has detected the overcurrent.

However, Osawa (Fig. 2), discloses a current sensing circuit which is used in a power circuit (abstract) comprising a shunt-detection part (42,43,25) which divides electric current applied to the drive switch (21) from a power source side (29,30) and detects the overcurrent (col. 1, ll. 6-10) and a function of limiting the electric current (col.

3, ll. 27-30) flowing in a power-MOS-FET (21) on the basis of the overcurrent detected by the shunt-detection part.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the (AAPA) by providing a shunt-detection part which divides electric current applied to the drive switch from a power source side and detects the overcurrent as taught by Osawa to provide a overcurrent sensing circuit which has low power consumption and high sensing accuracy.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Terrence R. Willoughby whose telephone number is 571-272-2725. The examiner can normally be reached on 8-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Sircus can be reached on 571-272-2800 ext. 36. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

9/7/06
TRW

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